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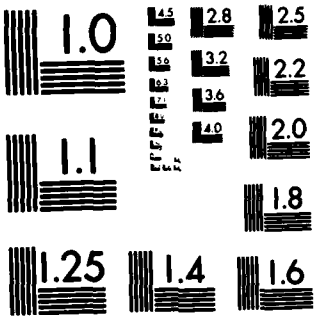

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Efforts continue on methods for estimation and control in distributed systems. Numerical work has also begun on these techniques. A complete treatment for the problem of estimating coefficients and boundary parameters in hyperbolic systems such as those that arise in geophysical inverse problems is given.

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Analysis, Modeling and Control of Dynamical Systems

H. T. Banks is continuing his efforts on methods for estimation and control in distributed systems. In [1] we presented theoretical formulations for approximation of feedback controls for parabolic systems. We have also begun numerical work on these techniques and our initial results are promising. A complete treatment for the problem of estimating coefficients and boundary parameters in hyperbolic systems such as those that arise in geophysical inverse problems is given in [2]. Both theoretical and numerical results are discussed.

Hale and Lin [3] has discussed the symbolic dynamics and its relation to chaotic behavior for transversal intersection of stable and unstable manifolds for differential equations with delays. Carr, Chow and Hale [4] have discussed the uniqueness of periodic orbits for autonomous second order equations and its relation to bifurcation theory. Hale and Rocha [5] have given the complete bifurcation diagrams for some special reaction-diffusion equations, concentrating on how the diffusion coefficient affects stability of equilibria.

References

1. Banks, H. T. and K. Kunisch, "Approximation of Feedback Controls for Parabolic Systems", Proc. 1983 Conf. on Decision and Control, Dec. 14-16, 1983; San Antonio, Texas, p. 247-251.

2. Banks, H. T. and K. Murphy, "Estimation of Coefficients and Boundary Parameters in Hyperbolic Systems", LCDS #84-5, Sub. SIAM J. on Contorl and Optimization.

3. Hale, J. K, and X.B. Lin, "Symbolic Dynamics and Nonlinear Semiflows", LCDS Report #84-8, March 1984.

4. Carr, J., S.-N. Chow, and J. K. Hale, "Abelian Integrals and Bifurcation Theory", LCDS #84-7, March 1984.

5. Hale, J. K, and C. Rocha, "Bifurcations in a Parabolic Equation with Variable Diffusion", LCDS #83-26, December 1983.

APPROXIMATION OF FEEDBACK CONTROLS FOR PARABOLIC SYSTEMS

by

H. T. Banks and K. Kunisch

ABSTRACT

We present an approximation framework for computation (in finite dimensional spaces) of Riccati operators that can be guaranteed to converge to the Riccati operator in feedback controls for abstract evolution systems in a Hilbert space. It is indicated how these results may be used in the linear optimal regulator problem for a large class of parabolic systems.

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Estimation of Coefficients and Boundary Parameters in Hyperbolic Systems

H. T. Banks and K. A. Murphy

ABSTRACT

We consider semi-discrete Galerkin approximation schemes in connection with inverse problems for the estimation of spatially varying coefficients and boundary condition parameters in second order hyperbolic systems typical of those arising in 1-D surface seismic problems. Spline based algorithms are proposed for which theoretical convergence results along with a representative sample of numerical findings are given.

Key words: Hyperbolic systems, parameter estimation, spline approximations

SYMBOLIC DYNAMICS AND NONLINEAR SEMIFLOWS

J. K. Hale and X.-B. Lin

ABSTRACT

For a transverse homoclinic orbit γ of a mapping (not necessarily invertible) on a Banach space, it is shown that the mapping restricted to orbits near γ is equivalent to the shift automorphism on doubly infinite sequences on infinitely many symbols. Implications of this result for the Poincaré map of flows are given.

ABELIAN INTEGRALS AND BIFURCATION THEORY

J. Carr, S.-N. Chow and J. K. Hale

Abstract

Conditions are given for uniqueness of limit cycles for autonomous equations in the plane. The results are applicable to codimension two bifurcations near equilibrium points for vector fields.

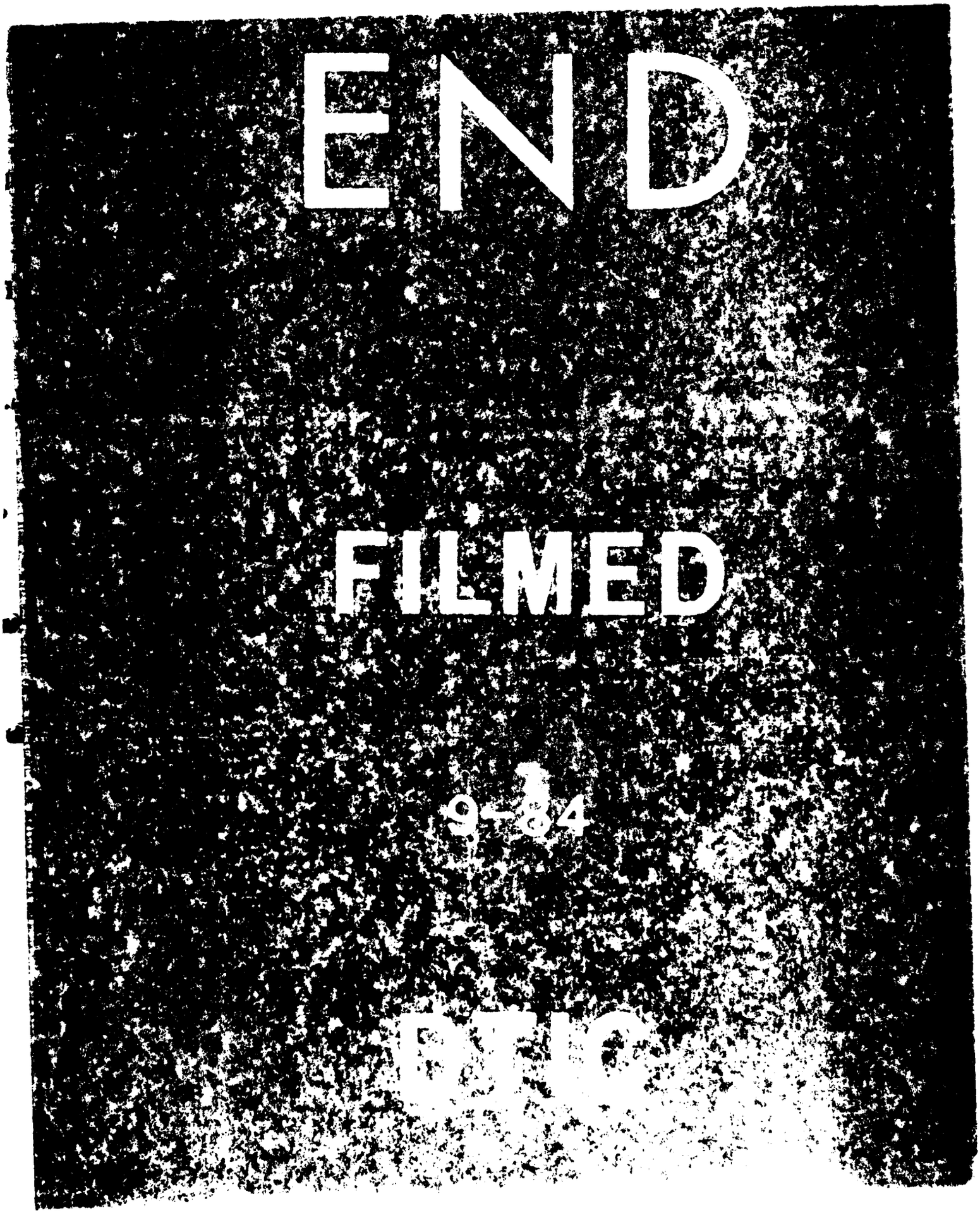
BIFURCATIONS IN A PARABOLIC EQUATION WITH VARIABLE DIFFUSION

by

Jack K. Hale and Carlos Rocha

ABSTRACT

For a particular class of scalar parabolic equations in one space variable with Neumann boundary conditions and a variable diffusion co-efficient, the stability and number of equilibrium solutions are discussed as functions of the diffusion co-efficients and the length of the interval.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